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ABSTRACT

Provided are high-strength steel which can be used as a raw material for a steel pipe which satisfies all the conditions that the steel pipe has a large diameter and the strength properties which are required for a high-strength steel pipe for steam transportation and a method for manufacturing the steel.

High-strength steel having a specified chemical composition, in which $X(\%)$ calculated by using equation (1) is 0.75% or more, a microstructure having a bainite phase fraction of 50% or more, a dislocation density of $1.0 \times 10^{15} / \text{m}^2$ or more after aging has been performed under the condition of a Larson-Miller parameter (LMP) of 15000, and a yield strength of 550 MPa or more before and after the aging is performed.

$$X = 0.35\text{Cr} + 0.9\text{Mo} + 12.5\text{Nb} + 8\text{V} \quad (1)$$

Here, the symbols of elements in equation (1) respectively denote the contents (mass%) of the corresponding chemical elements. In addition, the symbol of a chemical element which is not included is assigned a value of 0.

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DESCRIPTION

Title of Invention:

HIGH-STRENGTH STEEL, METHOD FOR MANUFACTURING HIGH-STRENGTH STEEL, STEEL PIPE, AND METHOD FOR MANUFACTURING STEEL PIPE

Technical Field

[0001]

The present invention relates to high-strength steel having a yield strength of 550 MPa or more before and after being subjected to long-term aging in a mid-temperature range. In particular, the high-strength steel according to the present invention can preferably be used as a raw material for a high-strength steel pipe for a steam line.

Background Art

[0002]

Examples of a method for recovering oil sand from an underground oil layer in, for example, Canada include an open-pit mining method and a steam injection method, in which high-temperature high-pressure steam is charged into an oil layer through steel pipes. Since there are only a small number of regions in which the open-pit mining can be used, the steam injection method is used in many areas.

[0003]

The temperature of steam which is charged into an oil layer in the steam injection method is in a temperature range of 300°C to 400°C (hereinafter, referred to as "a mid-

